

The Commonwealth Environmental Water Holder and the South Australian Department of Environment, Water and Natural Resources acknowledge Australia's Traditional Owners and respects their continued connection to water, land and community. We pay our respects to them, and to their elders past, present and future.

Commonwealth Environmental Water Holder

T: 1800 803 772

E: ewater@environment.gov.au

W: www.environment.gov.au/water/cewo

🐦 @theCEWH

Postal address: GPO Box 787,
Canberra ACT 2601

Department of Environment, Water and Natural Resources, South Australia

T: (+61 8) 8204 1910

E: dewnrinformation@sa.gov.au

W: www.environment.sa.gov.au

📘 @RiverMurraySA

🐦 @SADEWNR

Postal address: GPO Box 1047,
Adelaide SA 5001



Australian Government

Commonwealth Environmental Water Office



Government
of South Australia

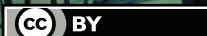
Department of Environment,
Water and Natural Resources

RESTORING AND PROTECTING THE COORONG, LOWER LAKES AND MURRAY MOUTH



Above: Smoking ceremony held at the launch of the Partnership Agreement between the Commonwealth Environmental Water Holder and the Ngarrindjeri Regional Authority. Photo: Matt Turner, Nature Foundation South Australia
Cover: Murray Mouth. **Back cover:** Pelicans with the Coorong in the background.

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Environmental water is dedicated to improving the health of our rivers, floodplains and wetlands

The Coorong, Lower Lakes and Murray Mouth region is one of Australia's most important wetland areas. It is home to a unique mosaic of 23 wetland types that support a diverse range of native waterbirds, fish, invertebrate and plant communities. The region is visited by 25 species of migratory birds listed under international conservation agreements along with threatened species protected under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. The Coorong and Lakes Alexandrina and Albert Wetland is listed as a wetland of international importance under the Ramsar Convention on Wetlands.

Found at the end of the River Murray system in south-east South Australia, the River Murray flows into Lake Alexandrina, the Coorong estuary and out to the Southern Ocean through the Murray Mouth.

Its waterways are a source of water for domestic use, irrigated agriculture, fishing, tourism and recreation activities and local Aboriginal cultural values and practices. The health of the region is central to the spiritual beliefs and cultural practices of the Traditional Owners, the Ngarrindjeri people.

The priority for Commonwealth environmental water is to support the maintenance of the ecological character of the site, as described under the Ramsar Convention, and support nationally threatened species. We are also working toward the achievement of environmental outcomes as outlined in the Basin-wide Environmental Watering Strategy (part of the implementation of the Murray-Darling Basin Plan).

Summary of long term outcomes outlined in the Basin-wide Environmental Watering Strategy:



Flows over the barrages are greater than 2000 GL/year on a three year rolling average 95 per cent of the time.

Water levels in the Lower Lakes are maintained above 0.4 metres above sea level for 95 per cent of the time, as far as practicable, to allow for barrage releases.

Salinity in the Coorong and Lake Alexandrina remains below critical thresholds for key plants and animals.

The Murray Mouth is open 90 per cent of the time and remains open at an average annual depth of one metre.



Maintain a sustained and adequate population of *Ruppia tuberosa* in the south lagoon of the Coorong.

Maintain the current species diversity and increase abundance of waterbirds by supporting breeding opportunities.



Maintain current populations of migratory shorebirds in the Coorong.



Maintain estuarine fish in the Coorong, including an increase in spawning and recruitment of mullet and the broad distribution of black bream and greenback flounder.

Ensure improved movement of native fish using fishways.

Ruppia tuberosa is a native aquatic plant that provides food and habitat for macroinvertebrates and fish. It is also an important food source for migratory waterbirds particularly in the Coorong. *Ruppia tuberosa* is an important indicator of the health and resilience of the Coorong system. Its reproduction requirements are influenced by the extent in which the Coorong's mudflats are covered in water over spring and summer. Due to reduced flows, increasing salinities and algal growth, the remnant populations in the south lagoon remain under threat. Barrage flow in spring and summer is critical for maintaining adequate water levels in the Coorong.



Environmental water use in the Coorong, Lower Lakes and Murray Mouth

The unique wetlands of the Coorong, Lower Lakes and Murray Mouth have been significantly affected due to human-driven changes and the building of infrastructure. However in recent years, programmes managing the delivery of environmental water to the area have begun to restore the wetlands.

Commonwealth environmental water is helping to increase the variability of lake water levels and maintain flows over the barrages into the Coorong to support connectivity between freshwater, estuarine and marine environments; including improving habitat condition for native fish and aquatic plants.

Environmental water delivered in recent years have significantly improved conditions in the Lower Lakes however the Coorong has shown limited recovery. The future survival of *Ruppia tuberosa* in the Coorong is at risk due to high salinity levels and insufficient flows into the lagoons to enable successful flowering and seed production. Maintaining ongoing connectivity between freshwater and marine environments continues to be crucial for supporting a diversity of fish species, and facilitating the movement and recruitment of species that rely on this connectivity. Improvement in spring estuarine conditions is also critical for supporting foraging habitat for migratory waterbirds.

Recruitment describes survival of juvenile birds, fish, invertebrates and plants. Supported recruitment means that over the long-term a species' population features a range of ages.

Environmental water is required to maintain continuous base flows through the barrages to avoid damage and support salt export from the River Murray and Lower Lakes. Between years with natural floods, environmental water plays a critical role in maintaining ecosystem condition.

Salt export describes the action of flushing salt from freshwater rivers, wetlands and lakes into the ocean. The River Murray contains salt which moves through the waterways. Environmental water provided for barrage flows is critical to enabling the export of salt from the Murray-Darling Basin. Each year, Commonwealth environmental water exports tonnes of salt. Without environmental water and flows over the barrages, the health of the Lower Lakes and Coorong would deteriorate significantly.

Commonwealth environmental water supply

The water acquired by the Australian Government, including through investment in more efficient irrigation infrastructure, and other measures, enables the Commonwealth Environmental Water Holder to help bring back some of the river flows needed to restore and protect the natural system throughout the Basin.

Depending on river operating conditions, flow constraints and climatic conditions, the Commonwealth Environmental Water Holder can agree to:

- use water to meet identified environmental demands;
- hold on to the water and carry it over for use in the next water year ('carryover'); or
- trade (sell or buy water) for equal or greater environmental benefit.



748 GL of Commonwealth environmental water was delivered to the Lower Murray-Darling region in **2015-16** (including 504 GL of return flows from upstream watering events)



2,853 GL of Commonwealth environmental water has been used in the Murray and Lower Darling regions **between 2008-09 and 2015-16**



Approximately **291 GL** was carried over from **2015-16** for use in the **2016-17** water year in the southern-connected Basin.

To date, there have been no specific requirements for sale or purchase of Commonwealth environmental water in the Lower Murray-Darling region.

COORONG, LOWER LAKES AND MURRAY MOUTH



Australian Government
Commonwealth Environmental Water Office

The Coorong, Lower Lakes and Murray Mouth wetland area is located in South Australia, around 180 km south-east of Adelaide.

The River Murray flows into Lake Alexandrina, which supplies Lake Albert to its east, and out to the Southern Ocean through the Coorong and Murray Mouth. Lake Alexandrina and Lake Albert are separated from the Coorong by a series of barrages built in the 1930s. The barrages control flow to the Coorong estuary and Murray Mouth.

The Coorong is a long, shallow lagoon more than 100 km in length, which is separated from the Southern Ocean by a narrow sand dune peninsula. Maintaining continuous flows between the Lower Lakes and Coorong is vital to maintaining the health of the region and the many species that rely on the wetland.

The Murray Mouth provides freshwater exchange and salt export from the River Murray to the Southern Ocean.

International significance

The Coorong and Lakes Alexandrina and Albert wetlands are internationally and nationally significant. The wetlands were formally recognised under the Ramsar Convention on Wetlands in 1985 and as a matter of national environmental significance under the *Environmental Protection and Biodiversity Conservation Act 1999*.

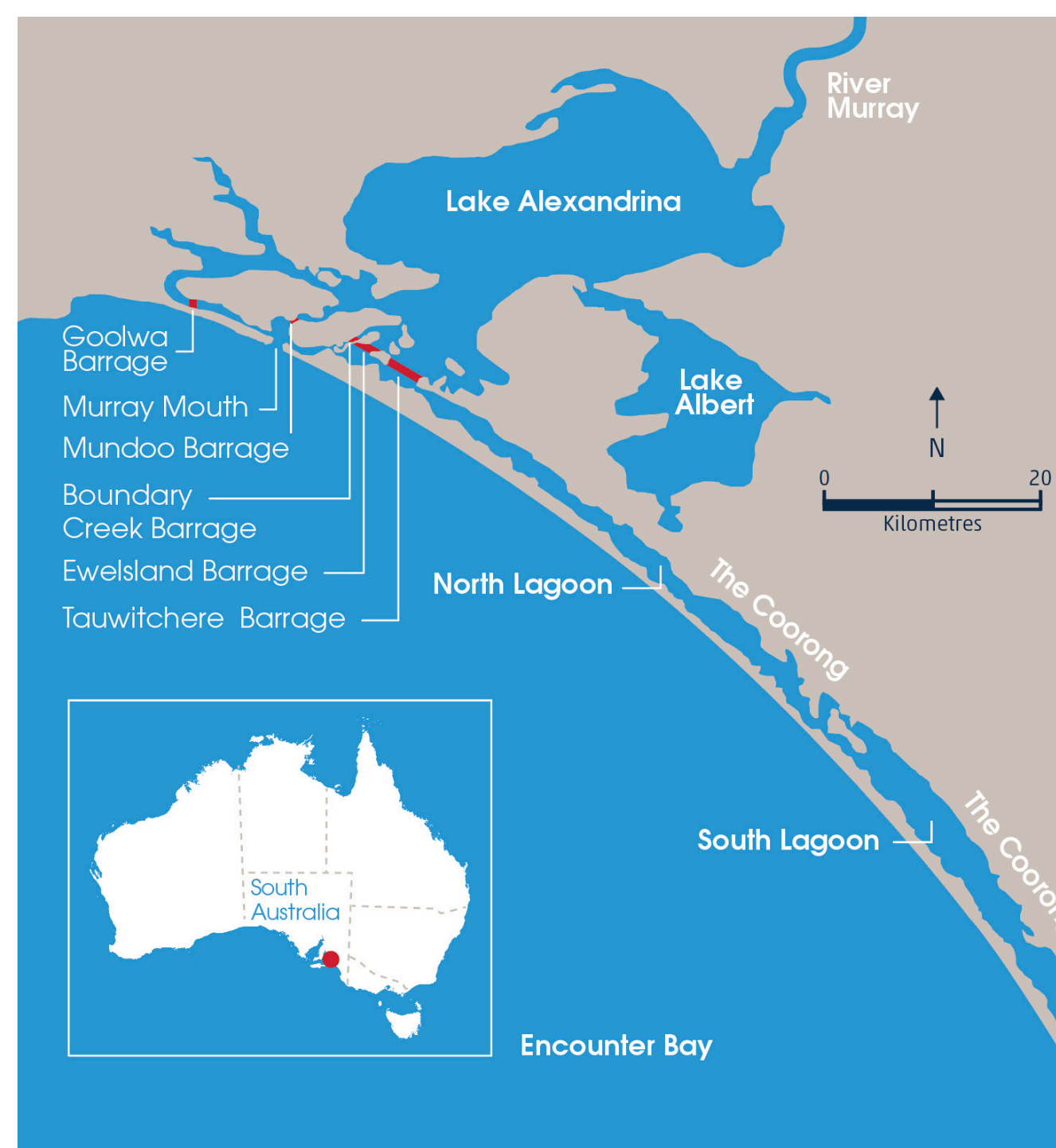
Reduced flows and likely impacts of climate change have had an adverse impact on the

Coorong and Lakes Alexandrina and Albert Ramsar site. Under the Ramsar Convention, Australia has an obligation to promote the conservation of listed wetlands and is required to inform the international community if the ecological character of any Ramsar-listed wetland has changed, is changing or is likely to change as a result of human activities.

Australia reported the changing ecological character of the Coorong in December 2006. Commonwealth environmental water, through the Basin Plan, is one strategy used to help sustain the wetland and ensure Australia meets its international obligation to protect the wetland.



Aerial view of the Murray Mouth connecting to the open sea. Photo: SA Department of Environment, Water and Natural Resources



A total of 23 wetland types are found in the Coorong and Lower Lakes, including intertidal mud, sand or salt flats, coastal brackish/saline lagoons, permanent freshwater lakes, marshes and pools, shrub-dominated wetlands, and water storage areas. The site is unique in providing a wide range of habitat for animals and plants.



The Coorong and Lower Lakes support at least 49 species of birds, including 25 species listed under international migratory conservation agreements. Waders and waterfowl are the dominant species, including the curlew sandpiper, black swan, cape barren goose, musk duck, straw-necked ibis, royal spoonbill, and Australian pelican. The wetlands also support several other threatened bird species including the orange-bellied parrot, Australasian bittern and Mount Lofty Ranges southern emu wren.



The region contains the threatened *Gahnia* sedgelands and part of the endangered swamps of the Fleurieu Peninsula. There are also six threatened plant species including the silver daisy-bush, sandhill greenhood and scarlet grevillea.



A large number of fish species are supported by the Coorong and Lower Lakes during critical stages of their life cycles. Several fish species move between fresh, estuarine and marine waters at various stages of their life to breed, including the common galaxias, congooli and estuary perch.



Approximately 10 species of frogs can be found around the Lower Lakes, including the southern bell frog which is listed as vulnerable under the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*.

Coorong, Lower Lakes and Murray Mouth Recovery Project

The Australian Government has committed \$123.3 million for the Coorong, Lower Lakes and Murray Mouth Recovery Project in South Australia, which commenced in 2010. Delivered in partnership with the South Australian Government, the project includes actions (some now complete) to:

- Help restore Coorong lagoons, lake and lakeshore habitat through revegetation, translocation of *Ruppia tuberosa*, the management of pests and protective fencing.
- Reduce and maintain salinity levels in the Coorong lagoons through the South East Flows Restoration Project.
- Reintroduce native fish and construct fish ways, allowing fish to move more freely between the lakes and the Murray Mouth Estuary.
- Undertake research into acid sulfate soils to help improve restoration and management of the lakes.
- Undertake community engagement and communication and engage the Ngarrindjeri in management of the site.
- Create a wetland at Meningie to restore the foreshore.
- Investigate the feasibility of management actions to improve water quality in Lake Albert through the Lake Albert Scoping Study.
- Implement the Milang foreshore habitat restoration project.
- Develop a Variable Lakes – Lower Lakes Water Level Policy and Barrage Operating Strategy to better manage the Lower Lakes.

Ngarrindjeri people and the Coorong, Lower Lakes and Murray Mouth

The Coorong, Lower Lakes and Murray Mouth area is of high cultural, spiritual, economic and social value to the Ngarrindjeri people. Ngarrindjeri culture and traditions and the region are inextricably linked. The wetlands of the region have a high cultural value for Ngarrindjeri people, regarded as a part of the system that cleanses the land and provides nurseries for Ngarrindjeri Ngartji's that are also bio-indicators of water quality.

Ngarrindjeri people also hold cultural and spiritual connections to particular places and, to particular species of animals and plants that are the Ngartji (totem or special friend) of the Ngarrindjeri people, who have special responsibility to care for their Ngartji. For example, *Pondi* (Murray Cod), are regarded by Ngarrindjeri people as the first fish in the *Kaldowinyeri* (the Creation). Important cultural and spiritual values are associated with *Pondi*. *Kungari*, the black swan, a totemic species and whose eggs are a regular part of the diet of many Ngarrindjeri people, also nests in the region.

But poor water quality in the Lower Lakes has impacted on the breeding cycle, and *Kungari* no longer breed with seasonal predictability.

The Ngarrindjeri people strongly advocate for improving the water quality and overall health of the Coorong, Lower Lakes and Murray Mouth. Ngarrindjeri cultural and spiritual values for the area are recognised in Coorong, Lower Lakes and Murray Mouth management plans, and the Ngarrindjeri Regional Authority have recently become a partner in the delivery of Commonwealth environmental water along the lower River Murray.

Responding to environmental demands

Like all water users, environmental water holders and managers must consider variable seasonal conditions when determining the best way to protect the Murray-Darling Basin's rivers, floodplains and wetlands.

This involves careful consideration of the urgency of environmental demands each year (and over multiple years) and what we believe can be achieved depending on water availability due to conditions.

There is a very high ongoing demand for Commonwealth environmental water in the Coorong to prevent further ecological decline and ensure its capacity to recover in future years. Conditions in the Coorong remain poor and environmental water is critical to maintain habitat for native estuarine fish and waterbirds and to avoid damage to *Ruppia tuberosa*.

In between naturally wetter years, recruitment of *Ruppia tuberosa* requires elevated water levels from spring to early summer. Years with more water make it more likely to achieve this outcome. Depending on the timing of the unregulated flow, Commonwealth environmental water can then be used to maintain elevated releases from the barrages. Under dry to moderate conditions, the contribution of environmental water, including re-using water from upstream actions, is critical to achieve minimum flow requirements to the Coorong.



Small vertical slot fishway at Pelican Point on Tauwitschere Barrage. Photo: SA Department of Environment, Water and Natural Resources



Outcomes Snapshot

The Commonwealth Environmental Water Office monitors the effectiveness of Commonwealth environmental water delivery, which is helping to identify what is working and what is not.

The results of our monitoring program are considered part of the planning and decision-making process. Collaboration with the Department of Environment, Water and Natural Resources, other State Government agencies, local delivery team partners and people living and working in the Murray-Darling Basin is essential in evaluating and improving this process.

Scientific monitoring shows that water delivered to the Coorong, Lower Lakes and Murray Mouth is providing habitat and breeding opportunities for many of the region's unique native fish, waterbirds, plants and wildlife.

Full monitoring reports are available each year on our website:
www.environment.gov.au/water/cewo

2014-15



Continuous flows into the Coorong were critical to protecting *Ruppia tuberosa* and estuarine fish species from increasing salinity. Environmental water contributed a significant proportion of the total amount of nutrients exported from the River Murray, Lower Lakes and Murray Mouth.



Commonwealth environmental water contributed all of the flows over the Lower Lakes' barrages into the Coorong from November 2014 to June 2015, enabling the export of more than half the total salt exported from the Lower Lakes.

2013-14



Water quality continues to improve as salt is being exported from the River Murray into the Southern Ocean via the Murray Mouth.



Modelling indicated that Commonwealth environmental water contributed to a significant increase in the chance for *Ruppia tuberosa* reproduction in the Coorong.



Modelling indicated that Commonwealth environmental water improved habitat suitability for native fish.